REMARKS

I. Introduction

The final Office Action of January 13, 2009 has been reviewed and the Examiner's comments carefully considered. Claims 1-16 were previously pending in this application. The present Amendment amends claim 11 and adds new claims 17-23 all in accordance with the originally-filed specification. No new matter has been added by this Amendment. In addition, the present Amendment cancels claims 1-5 and 13. Additionally, claims 6-10, 12, 14, and 16 were withdrawn from further consideration in view of an earlier restriction requirement. The Applicants reserve the right to file a divisional application directed to the non-elected claims. Accordingly, claims 11, 15, and 17-23 remain in this application, and claims 11 and 21-23 are in independent form.

II. Interview of May 6, 2009

The Applicants would like to thank Examiner Roe for the courtesies extended to the Applicants' representative during the telephonic interview of May 6, 2009. During the interview, the Applicants' representative presented the Examiner with the various amendments to the claims. The Examiner advised that these amendments would not overcome the rejections set forth in the final Office Action. The Examiner further indicated that additional evidence, in the form of a Declaration under 37 C.F.R. §1.132, showing new or unexpected results based on the claimed invention or the criticality of the claimed ranges was necessary in order to overcome the prior art rejections of record. Accordingly, the Applicants submit herewith two Declarations Under 37 C.F.R. §1.132 of Shinya Kagei as will be discussed in greater detail hereinafter.

III. 35 U.S.C. §112, Second Paragraph Rejections

Claims 1-5, 11, 13, and 15 stand rejected under 35 U.S.C. §112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which the Applicants regard as the invention. More specifically, the Examiner rejected independent claim 1, alleging that the specification does not provide support for the range of a of $4.31 \leq a \leq 4.7$. Independent claim 1 has been cancelled by the present Amendment, thereby

rendering the rejection of independent claim 1 moot. However, since this language has been incorporated into independent claim 11, this rejection will be addressed hereinafter. Support for a range of *a* of $4.31 \leq a \leq 4.7$ is clearly provided in Sample 17 at Table 1 on pages 15-16 of the specification of the above-referenced application. Accordingly, the Examiner was contacted and directed to this portion of the specification on June 1, 2009. The Examiner indicated that he would withdraw this rejection. Reconsideration and withdrawal of this rejection are respectfully requested.

IV. 35 U.S.C. § 103 Rejections

A. United States Patent No. 6,372,059 to Yasuda et al.

Claims 1, 2, 11, 13, and 15 stand rejected under 35 U.S.C. § 103(a) for obviousness based upon United States Patent No. 6,372,059 to Yasuda et al. (hereinafter "the Yasuda patent"). In view of the above amendments and the following remarks, the Applicants respectfully request reconsideration of this rejection.

As defined by amended independent claim 11, the present invention is directed to a low Co hydrogen storage alloy having a $CaCu_5$ crystal structure that can be represented by the general formula $MmNi_aMn_bAl_cCo_d$. Mm is a Misch metal, $4.31 \leq a \leq 4.7$, $0.3 \leq b \leq 0.65$, $0.2 \leq c \leq 0.5$, $0 < d \leq 0.35$, $5.2 \leq a + b + c + d \leq 5.5$. In a composition of $5.25 \leq a + b + c + d < 5.30$, the a-axis length of the crystal lattice is not less than 500.5 pm and not more than 502.7 pm, and the c-axis length is not less than 405.6 pm and not more than 406.9 pm. The pulverization residual rate obtained by the following equation is 50% or more: Pulverization residual rate (%) = (post-cycling particle size/pre-cycling particle size) x 100. When a hydrogen storage alloy is ground and screened to select particles with a particle size in the range of 20 μm and 53 μm to provide hydrogen storage alloy powder, and after measuring with a particle size distribution measuring device the average particle size (pre-cycling particle size, D_{50}) of the hydrogen storage alloy powder; 2 g of the hydrogen storage alloy powder is weighed and placed into a PCT holder; the surfaces thereof are cleaned twice under hydrogen pressure of 1.75 MPa; then activation is carried out twice by introducing hydrogen of 3 MPa; next, a cycle test using a PCT device is then repeated 50 times, wherein hydrogen gas of 3 MPa is introduced into 2.0 g of the hydrogen

storage alloy powder to absorb hydrogen, and the hydrogen is desorbed at 45°C; and the average particle size of the hydrogen storage alloy powder after the test of the 50 cycles (post-cycling particle size, D_{50}) is measured with a particle size distribution measuring device.

The Yasuda patent discloses a hydrogen storage material which is an AB_5 type hydrogen storage alloy having a $CaCu_5$ type crystal structure represented by general formula: $MmNi_aMn_bAl_cCo_dX_e$, where Mm denotes a Misch metal, $4.0 < a \leq 4.3$, $0.25 \leq b \leq 0.4$, $0.25 \leq c \leq 0.4$, $0.3 \leq d \leq 0.5$, and $5.05 \leq a + b + c + d \leq 5.25$ and X is Cu and/or Fe.

The Yasuda patent does not teach or suggest Applicants' claimed low Co hydrogen storage alloy, represented by the general formula $MmNi_aMn_bAl_cCo_d$, wherein $4.31 \leq a \leq 4.7$. In the Yasuda patent,the range of *a* is $4.0 < a \leq 4.3$ (*see* the Abstract of the Yasuda patent). The Examiner contends that although the Yasuda patent does not disclose a range of *a* that is within the claimed range of *a* or overlaps the claimed range of *a*, a *prima facie* case of obviousness exists because the claimed ranges and prior art ranges do not overlap but are close enough that one skilled in the art would have expected them to have the same properties. While this statement by the Examiner is true, the law requires that a reference be considered for all of its teachings, including a disclosure that diverges and teaches away from the invention at hand as well as disclosures that point toward and teach the invention when interpreting the patentability of a claim. A *prima facie* case of obviousness cannot exist where a reference teaches away from the claimed invention. The Yasuda patent clearly teaches away from Applicants' claimed invention by stating that "the ratio of Ni, a, is from 4.0 to 4.3, desirably from 4.1 to 4.2. If a is less than 4.0, the discharge characteristics are not satisfactory. If it exceeds 4.3, deterioration in insusceptibility to grain size reduction or life characteristics is observed" (Emphasis added).

Accordingly, the Yasuda patent teaches away from the claimed invention and the advantages and properties of the hydrogen storage alloy of the present invention cannot be expected from the hydrogen storage alloy of the Yasuda patent.

Furthermore, the Examiner has mischaracterized independent claim 11 as a product-by-process claim and contends that claim 11 is unpatentable in view of the Yasuda patent even though the hydrogen storage alloy of the Yasuda patent is made from a different process. However, the pulverization residual rate of the low Co hydrogen storage alloy of

independent claim 11 is a property of the low Co hydrogen storage alloy and not a method of manufacturing a low Co hydrogen storage alloy. Accordingly, the pulverization residual rate of the low Co hydrogen storage alloy, along with the steps for determining this rate, of independent claim 11 must be considered by the Examiner because "[t]he structure implied by the process steps should be considered when assessing the patentability of product-by-process claims over the prior art" (*see* Manual of Patent Examining Procedure (MPEP) §2113).

To establish *prima facie* obviousness of a claimed invention, all of the claim limitations must be taught or suggested by the prior art. Where claimed limitations are simply not present in the prior art, a *prima facie* obviousness rejection is not supported. Accordingly, since the Yasuda patent fails to teach or suggest a low Co hydrogen storage alloy, represented by the general formula $MmNi_aMn_bAl_cCo_d$, wherein $4.31 \leq a \leq 4.7$ and a low Co hydrogen storage alloy having a pulverization residual rate obtained by the following equation is 50% or more: Pulverization residual rate (%) = (post-cycling particle size/pre-cycling particle size) x 100 as required by independent claim 11 as discussed above, a *prima facie* case of obviousness has not been established.

For the foregoing reasons, the Applicants believe that the subject matter of independent claim 11 is not obvious in view of the Yasuda patent. Reconsideration and withdrawal of the rejection of claim 11 is respectfully requested.

Claim 15 depends from and adds further limitations to independent claim 11 and is believed to be patentable for at least the reasons discussed hereinabove in connection with independent claim 1. In addition, claims 1, 2, and 13 are cancelled by the present Amendment, thereby rendering the rejection of these claims moot. Reconsideration and withdrawal of the rejection of claim 15 are respectfully requested.

B. United States Patent No. 6,261,517 to Kaneko et al.

Claims 1-5, 11, 13, and 15 stand rejected under 35 U.S.C. § 103(a) for obviousness based upon United States Patent No. 6,261,517 to Kaneko et al. (hereinafter "the Kaneko patent"). In view of the above amendments and the following remarks, the Applicants respectfully request reconsideration of this rejection.

As defined by amended independent claim 11, the present invention is directed to a low Co hydrogen storage alloy having a $CaCu_5$ crystal structure as described in greater detail hereinabove.

The Kaneko patent is directed to a rare earth metal-nickel hydrogen storage alloy of a composition represented by the formula: $RNi_aMn_bCO_cAl_dX_e$, where R stands for one or more rare earth elements including Sc and Y, not less than 95 atom % of which is one or more elements selected from the group consisting of La, Ce, Pr, and Nd; X stands for one or more elements selected from the group consisting of Fe, Cu, Zn, V, and Nb; a, b, c, d, and e satisfy the relations of $3.9 \leq a < 6.0$, $0.45 \leq b < 1.5$, $0.01 \leq c < 0.3$, $0.4 \leq d \leq 1$, $0 \leq e \leq 0.2$, and $5.2 \leq a+b+c+d+e \leq 7.5$), the alloy having a matrix of $CaCu_5$ structure, and a Mn-rich secondary phase of 0.3 to 5 μm is finely dispersed in the matrix at surface ratio of 0.3 to 7%.

The Kaneko patent does not teach or suggest, and in fact, does not even mention that the low Co hydrogen storage alloy requires, in a composition of $5.25 \leq a + b + c + d < 5.30$, that the a-axis length of the crystal lattice is not less than 500.5 pm and not more than 502.7 pm, and the c-axis length is not less than 405.6 pm and not more than 406.9 pm as required by independent claim 11.

As stated in paragraphs [0070] and [0071] of the specification of the present application, the a-axis length and c-axis length of the crystal lattice are greatly influenced by casting conditions and heat-treatment conditions. Although component composition of the alloy of the Kaneko patent and the alloy of the claimed invention overlap, the a-axis length and the c-axis length are not the same. Further, it is a fact that crystal lattice length is different if casting conditions and heat-treatment conditions are different, even if the alloy composition of the hydrogen storage alloy is the same. For example, the last paragraph on page 93 of the article titled "Improvement of Characteristics of Hydrogen Storage of Mischmetal-Nickel-Manganese Alloy", *Bulletin of The Government Industrial Research Institute*, Osaka, 35[2] (1984), pp. 90-96, explains that axis length varies depending on heat-treatment condition. A copy of this article is submitted herewith in a Supplemental Information Disclosure Statement for consideration with the Examiner.

In general, c-axis length can be grown by accelerating a cooling rate at casting and raising a heat-treatment temperature. However, depending on a composition, there is a case that c-axis length grows although heat-treatment temperature is low adversely (*see* paragraph [0070] of the present specification). In other words, a prescribed a-axis length and c-axis length can be achieved by adjusting a balance among composition, casting conditions, and heat-treatment conditions. Even if one of those conditions among alloy composition, casting conditions, and heat-treatment conditions overlaps, one of ordinary skill in the art would be unable to achieve the hydrogen storage alloy of the present invention without undue experimentation as described in one of the Declarations under 37 C.F.R. §1.132 of Shinya Kagei, labeled Declaration 2.

Furthermore, the Declaration under 37 C.F.R. §1.132 of Shinya Kagei labeled Declaration 1 sets forth experimental data that confirms that the a-axis length and the pulverization residual rate of the storage alloy disclosed in the Kaneko patent do not fall within the range specified in the present invention by reproducing Example I of the Kaneko patent. This experimental data clearly shows the hydrogen storage alloy of the Kaneko patent does not have an a-axis length that falls within the claimed range (*see* paragraph 6 of Declaration 1) and the pulverization residual rate of the hydrogen storage alloy does not fall within the claimed range (*see* paragraph 6 of Declaration 1).

A hydrogen storage alloy of the present invention has an a-axis length and c-axis length that is not disclosed or suggested by the Kaneko patent and a superior pulverization residual rate can be achieved by the alloy of the present invention. The alloy of the claimed invention has a pulverization residual rate that is 50% or more by specifying value range of a-axis length and c-axis length at each range of ABx. This result cannot be achieved by one of ordinary skill without the need for undue experimentation and is a new and unexpected result (*see* paragraph 9 of Declaration 1).

For the foregoing reasons, the Applicants believe that the subject matter of independent claim 11 is not obvious in view of the Kaneko patent. Reconsideration and withdrawal of the rejection of claim 11 is respectfully requested.

Claim 15 depends from and adds further limitations to independent claim 11 and is believed to be patentable for at least the reasons discussed hereinabove in connection with independent claim 11. In addition, claims 1-5 and 13 are cancelled by the present Amendment, thereby rendering the rejection of these claims moot. Reconsideration and withdrawal of the rejection of claim 15 are respectfully requested.

V. New Claims

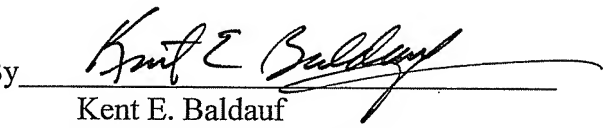
New claims 17-23 have been added by this Amendment. New claims 17-20 depend from independent claim 11 or a subsequent dependent claim. No new matter has been added. Support for these claims can be found in the specification and drawings as originally filed. Specifically, support for "$0.4<b\leq 0.55$" of new claim 17 can be found at paragraph [0064] of the specification of the present application, and support for "$0<d\leq 0.2$" of new claim 18 can be found at paragraph [0062] of the specification. New claims 21-23 are in independent form. New claims 17-23 are also believed to be allowable over the prior art of record for at least the reasons discussed hereinabove in connection with independent claim 11.

VI. Conclusion

Based on the foregoing amendments and remarks, reconsideration of the rejections and allowance of pending claims 11, 15, and 17-23 are respectfully requested. Should the Examiner have any questions or wish to discuss the application in further detail, the Examiner is invited to contact Applicants' undersigned representative by telephone at 412-471-8815.

Respectfully submitted,

THE WEBB LAW FIRM

By 

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